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Phase diagram and extremal properties of the hierarchical integer-valued GFF

Tuesday, May 20, 2025 3:00 PM (1 hour)

I will review recent progress, obtained jointly with my student H. Huang, on the hierar-chical integer-valued GFF, a.k.a., the DG model or Villain Coulomb gas model. Specifically, I will describe the asymptotic form of the covariance and the characteristic function of the field at inverse temperatures below, at and slightly above a critical value where both of these quantities undergo a phase transition. Below the critical inverse temperature, where the field is asymptotically close to continuum-valued GFF, I will give a description of the scaling limit of the absolute maximum and the associated extremal process. The main technique of proofs is renormalization which, although much easier in the hierarchical context than on a lattice, is still quite diffcult to control near, let alone beyond, the critical point.

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